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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,290	07/10/2003	Ralph H. Johnson	H26341-D1 US	2653

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EXAMINER

MENEFEE, JAMES A

ART UNIT

PAPER NUMBER

2828

DATE MAILED: 08/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/617,290	Applicant(s) JOHNSON ET AL.	
	Examiner James A. Menefee	Art Unit 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 32-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 38-45 is/are allowed.
- 6) ☒ Claim(s) 32-37 and 46-52 is/are rejected.
- 7) ☒ Claim(s) 53 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Response to Amendment

In response to the amendment filed 5/30/2006, claims 32 and 53 are amended. Claims 32-53 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 32-37 and 46-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cox (US 5,812,581; see Fig. 6 and the discussion thereof unless otherwise noted) in view of Choquette et al. (US 5,493,577), and further in view of Lear (US 5,633,527).

Regarding claim 32, Cox discloses a device comprising a substrate S, a first DBR BM formed on the substrate, an active region A formed over the first DBR, and a second DBR TM

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formed over the active region, the second DBR comprising a first DBR mirror layer (below the section 60) and a second DBR mirror layer (at the section 60) having an insulating layer 60 defining an aperture (the portion between the sections 60 will be an aperture) and an isolation implant region 62 extending around and spaced outwardly from the perimeter of the aperture and traversing through the insulating layer and at least some of the DBR layers (indeed it goes through all of top mirror TM).

While Cox does not explicitly refer to the mirrors as DBRs, Cox refers to the mirrors, for example TM, as comprising a plurality of layers and with a structure as described in the cited patents in the background of the invention. See col. 6 lines 40-46. Several patents describe such mirrors as DBRs.

It is not disclosed that the second DBR mirror layer has a doping level higher than that of the first DBR mirror layer.

Cox's insulating layer is ion implanted. However, Choquette teaches that such ion implanted layers may be advantageously replaced by an oxidized insulating layer 20. It would have been obvious to one skilled in the art to use an oxidized layer as in Choquette, rather than the ion implanted layer of Cox, because this improves device characteristics such as threshold current density. See Choquette col. 19 lines 8-21. As the layer is oxidized, it is necessarily insulating.

Cox's second DBR may be p-type. Col. 6 lines 47-48. Lear teaches that oxidation extent is dependent on dopant level, and that a higher doping level yields more oxidation. See col. 7 lines 44-59. Since the second DBR layer is where the oxidation occurs, it would have been obvious to one skilled in the art to make that layer higher in dopant level as a means for

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controlling the oxidation extent of such a layer, as taught by Lear; since that is the only layer that is supposed to be oxidized, it would have been higher doped in order to facilitate such oxidation.

Regarding claim 33, the second DBR mirror layer is over the first as described above.

Regarding claim 34, the isolation implant region 62 extends entirely around the perimeter of the aperture formed by insulating layer 60.

Regarding claims 35-36, the isolation implant region 62 defines an aperture larger than and substantially coaxial with the insulating layer aperture. The layers of the present invention described as isotropic are typical DBR layers, and thus it may be presumed inherent that Cox's DBR layers are also isotropic.

Regarding claim 37, the isolation implant region is implanted with hydrogen ions, therefore protons. Col. 7 lines 62-63.

Regarding claims 46 and 49-52, these claims are merely methods comprising the steps of forming the devices as claimed in the above claims, and therefore are rejected for the same reasons.

Regarding claims 47-48, the isolation implant region extends through the active layer and into the lower mirror.

Allowable Subject Matter

Claims 38-45 are allowed. Claim 53 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Reasons were given in the action mailed 12/30/2005.

Response to Arguments

Applicant's arguments filed 5/20/2006 ("Remarks") have been fully considered but are not persuasive.

Applicant claims that the examiner has failed to establish a motivation for combining Cox and Choquette. *See* Remarks at 7. Applicant argues that the examiner's motivation for combining—improves device characteristics—"is a relative term whose definition is known only to the Examiner. For example, it is not at all apparent what reference point(s), if any, the Examiner is using as a basis to assert that threshold current density improvements would necessarily be achieved as a result of the purportedly obvious combination."¹ *Id.* Applicant concludes that for this reason there is no motivation to combine the references.

There is no legal basis in applicant's argument. There is no requirement that a showing of relative improvement is insufficient to support a *prima facie* case of obviousness. Applicant is apparently arguing that some quantitative motivation must be shown, or that one skilled in the art must be certain that modifying Cox must result in an improvement before such a modification can be performed. But applicant sets a higher bar than is required to show obviousness.

The prior art must provide a suggestion or motivation to combine the references. *See* MPEP 2143 (quoted in Remarks at 6-7). Choquette is clear that oxidation is an improvement over ion implantation.² This would appear to be enough of a suggestion to combine the

¹ It should be noted that "improves" is a relative term whose definition is known by Choquette, as Choquette describes the use of oxidation as an improvement. *See infra* notes 2-3. Any implication that the examiner is not taking the motivation from the prior art is therefore incorrect.

² The examiner cited col. 19 lines 8-21 in the rejection above and previously. This part references Figures 8-9, showing characteristics of oxidized VCSELs like Choquette's device, and also ion implanted VCSELs. Choquette then states that "This further shows the improvement in device characteristics realized according to the present

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references. Applicant's argument is that one skilled in the art would ignore Choquette because it is not precisely clear how much of an improvement will take place. The examiner disagrees. Any improvement suggests the desirability of combining the references. One skilled in the art does not measure the degree of improvement and determine that a combination will be made only if a significant or quantifiable improvement will occur.³ One skilled in the art makes the combination if it appears desirable as suggested by the prior art. The examiner's position is that the present situation, where the prior art describes that a certain type of device provides an improvement over another type of device, is sufficient and supports the modification.

The examiner also takes issue with the notion, expressed in the quotation from applicant above, that the assertions by the examiner must "necessarily be achieved" as a result of the combination. There is no requirement that any improvements to the prior art must necessarily be present; such a requirement would seem to be nearly impossible to be proved in many cases. Instead, it is well settled that prior art may be combined so long as there is a reasonable expectation of success. *See* MPEP 2143.02. Here, Choquette's teaching that oxidized VCSELs generally have improved characteristics over ion implanted VCSELs sufficiently provides a reasonable expectation of success that modifying Cox in this manner will provide like improvements.

The applicant next argues that there has been no showing that Cox suffers from any shortcomings that would be remedied by Choquette's disclosure. Remarks at 7. But the section of Choquette cited by the examiner, col. 19 lines 8-21, tells us Cox's shortcomings. Choquette

invention." Col. 19 lines 15-16. Choquette goes on to state that the improvements lead to lower dependence on layer thickness variations during growth, and enhancement of manufacturability.

³ For what it may be worth, Choquette does indeed state the improvement of oxidization over ion implantation as "significant." Col. 18 lines 60-62.

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discusses improvements of oxidized VCSELs versus ion implanted VCSELs such as Choquette's device. There is no requirement that Cox must recognize the shortcomings himself, or that Choquette must specifically recognize the shortcomings of Cox. It is enough that Choquette recognizes shortcomings in a certain type of device, and Cox is that type of device.

Applicant next argues that the examiner is improperly relying on personal knowledge in stating that Choquette's oxidized layer is insulating. But Choquette teaches that the oxidized portion of layer 20 is insulating. Col. 10 lines 18-23 (discussing the "insulating nature of the annular oxidized portion of the control layer 20").

Conclusion

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR

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1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (571) 272-1944. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



James Menefee
Primary Examiner
July 25, 2006